APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/624,106	07/24/2000	Pietro Buttolo	200-0032	6480

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KEVIN G. MIERZWA
ARTZ & ARTZ, P.C.
28333 TELEGRAPH ROAD, SUITE 250
SOUTHFIELD, MI 48034

EXAMINER
BRODA, SAMUEL

ART UNIT	PAPER NUMBER
2123	3

DATE MAILED: 12/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/624,106	BUTTOLO ET AL.
	Examiner	**Art Unit**	
	Samuel Broda	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>24 July 2000</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-9</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-9</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>24 July 2000</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

    a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.

4)☐ Interview Summary (PTO-413) Paper No(s). _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: .

DETAILED ACTION

1.   Claims 1-9 have been examined.

Drawings

2.   Applicants' formal drawings have been reviewed and approved by the PTO Draftsperson.

Claim Rejections - 35 U.S.C. § 112, Second Paragraph

3.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3.1   Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Claim 3 is dependent on claim 2 and recites the limitation of eliminating at least one duplication of vertices in the step of generating a representative index. Claim 2 is dependent on claim 1 and limits the step of building vertex and edge connectivity data.

In independent claim 1, the step of finding duplicates of vertices appears after the step of building vertex and edge connectivity data. Therefore, when claim 3 is read in conjunction with claims 1 and 2, at least one duplication of vertices is eliminated prior to the step of finding duplicates of vertices. This appears inconsistent.

Claim Rejections - 35 U.S.C. § 101

4.   The following is a quotation of 35 U.S.C. 101:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4.1   Method claims 1-9 are rejected under 35 U.S.C. 101 for reciting a process that is not directed to the technological arts.

4.2   Regarding claim 1, this claim is directed at a method for reconstructing topological information for a mesh. To be statutory, the utility of an invention must be within the technological arts. *In re Musgrave*, 167 USPQ 280, 289-90 (CCPA, 1970). The definition of "technology" is the "application of science and engineering to the development of machines and procedures in order to enhance or improve human conditions, or at least to improve human efficiency in some respect." (Computer Dictionary 384 (Microsoft Press, 2d ed. 1994)).

The limitations recited in claim 1 contain no language suggesting that claim 1 is intended to be within the technological arts, such as performance of the limitations on a computer.

4.3   Method claims 1-9 are rejected under 35 U.S.C. 101 for reciting a process comprising an abstract idea.

4.4   Regarding claim 1, this claim is directed to "a method for reconstructing topological information for a mesh," and the steps recited in claim 1 describe the abstract idea

removing duplicate vertices and realigning strips of triangles without common vertices. These

steps do not:

(1) recite data gathering limitations or post-mathematical operations that might

independently limit the claims beyond the performance of a mathematical operation; or

(2) limit the use of the output to a practical application providing a useful, concrete, and

tangible result.

4.5   Claims 2-9 are dependent on claim 1 and rejected using the same analysis.

Claim Rejections - 35 U.S.C. § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> . . .
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or
> on sale in this country, more than one year prior to the date of application for patent in the United States.

5.1   Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Schroeder

et al, "Decimation of Triangle Meshes," Proceedings of the 19th Annual Conference on

Computer Graphics and Interactive Techniques, Vol. 26 No. 2, pp. 65-70 (July 1992).

5.2   Regarding claim 1, Schroeder et al teaches a method for reconstructing

topological information for a mesh, the mesh comprising a polygonal soup of triangles with sides

and vertices, the method comprising the steps of:

building vertex and edge connectivity data [characterizing the local vertex geometry and

topology, Sections 3.1 and 3.2, page 66];

finding duplicates of vertices [duplicate vertices classified as: {simple, complex,

boundary, interior edge, corner}, Fig. 1 page 66];

removing the duplicates of vertices [duplicates removed during decimation step, Sections

3.2 – 3.4, pages 66-67]; and

realigning strips of triangles without common vertices [realignment performed after

decimation in triangulation step, Section 3.4 and 4.2, page 67].

Therefore, Schroeder et al anticipates claim 1.

5.3   Regarding claims 2-3, the method of Schroeder et al generates a representative

index corresponding to the vertex classification (see Fig. 1, page 66) and generates a data

structure including a vertex-neighbor table and edge-neighbor table (see Section 4.1, page 67).

Allowable Subject Matter

6.   Claims 4-9 would be allowable if rewritten to overcome the rejections under 35 U.S.C.

101, set forth in this Office action and to include all of the limitations of the base claim and any

intervening claims.

Conclusion

7.   The prior art made of record and not relied upon is considered pertinent to Applicants'

disclosure. Reference to Junkins, U.S. Patent 6,606,584 issued 12 August 2003, is cited as

teaching a method of defining a neighborhood of vertices in a 3D surface mesh.

Reference to Waupotitsch al, U.S. Patent 6,563,499 issued 13 May 2003, is cited as

teaching a method for generating a 3D region from surrounding imagery and includes a meshing

process using an Octree encoding a 3D region. See Fig. 9 and corresponding text.

Reference to Sakaguchi et al, U.S. Patent 5,946,479 issued 31 August 1999, is cited as

teaching a method for generating mesh elements from nodes.

Reference to Gran, "Octree-based Simplification of Polyhedral Solids," Doctoral Thesis,

Computer Science Department, Universitat Politècnica de Catalunya, pp. 1-128 (June 1999),

paper available at: http://citeseer.nj.nec.com/348763.html, is cited as teaching an overview of

geometry and surface simplification.

Reference to Kalvin et al, "Superfaces: Polygonal Simplification with Bounded Error,"

IEEE Computer Graphics and Applications, pp. 64-77 (May 1996), is cited as teaching the

Superfaces algorithm.

Reference to Arata, "Simplification of Triangle Meshes for Fast Surface Rendering of

Tomographic Data," IEEE Nuclear Science Symposium and Medical Imaging Conference, Vol.

3 pp. 1438-1442 (October 1994), is cited as teaching decimation of triangle meshes by merging

of vertices which are closer than a specified distance.

8.   Any inquiry concerning this communication or earlier communications from the

Examiner should be directed to Samuel Broda, whose telephone number is (703) 305-1026. The

Examiner can normally be reached on Mondays through Fridays from 8:00 AM – 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's

supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone number for the

organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the group receptionist, whose telephone number is (703) 305-3900.

SAMUEL BRODA, ESQ.
PRIMARY EXAMINER